

The Cooper Union
Department of Mathematics

SYLLABUS

MA 113 (4 cr.) **Calculus II** (Spring)

Text: *Thomas' Calculus*,

Weir, Hass

Twelfth Edition,

Pearson

1. Parametrization of plane curves (11.1). Calculus with parametric curves (11.2, pp. 618-624). Arc length (6.3).
2. A review of Vector Algebra (Ch. 12.1-5). Curves in space and their tangents (13.1). Integrals of vector functions (13.2).
3. Arc length in space (13.3). Curvature and normal vectors of a curve (13.4). Tangential and normal components of acceleration (13.5).
4. Volumes using cross-sections (6.1). Volumes using cylindrical shells (6.2). Areas of surfaces of revolution (6.4, 11.2, pp.624-625).
5. Work and Fluid forces (6.5). Moments and centers of mass (6.6). Polar coordinates (11.3).
6. Graphing in polar coordinates (11.4). Areas and lengths in polar coordinates (11.5). Conic sections (11.6).
7. Conics in polar coordinates (11.7). Velocity and acceleration in polar coordinates. (13.6).
8. Sequences (10.1). Infinite series (10.2). The integral test (10.3).
9. Comparison tests (10.4). The ratio and root tests (10.5). Alternating series. Absolute and conditional convergence (10.6).
10. Power series (10.7). Taylor series (10.8). Convergence of Taylor series (10.9).
11. The binomial series and Applications of Taylor series (10.10). Complex numbers and Euler's formula (Ap. 7). Function in several variables (14.1).
12. Cylinders and quadratic surfaces (12.6). Limits and continuity (14.2). Partial derivatives (14.3).
13. The chain rule (14.4). Directional derivatives and gradient vectors (14.5). Tangent planes and differentials (14.6).
14. Taylor's formula for two variables (14.9). Extremal values and saddle points. (14.7). Lagrange multipliers (14.8).